NOTICE OF REQUIREMENT - SOUTHWEST WASTEWATER TREATMENT PLANT – TRANSPORTATION

Report

31 August 2023

Ref: 310103911

PREPARED FOR:

Watercare Services Limited

PREPARED BY:

Stantec - New Zealand

Stantec

Revision Schedule

Revision No.	Date	Description	Prepared by	Quality Reviewer	Independent Reviewer
0	26/05/23	Draft - for Watercare review	AMM	HP	KB
1	22/06/23	Final Draft	AMM	HP	KB
2	29/08/23	Final	AMM	TLJ	KB

Disclaimer

The conclusions in the Report titled Notice of Requirement - Southwest Wastewater Treatment Plant- Transportation Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Watercare Services Limited (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided to applicable authorities having jurisdiction and others for whom the Client is responsible, Stantec does not warrant the services to any third party. The report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec's discretion.

PREPARED BY

Alasdair McGeachie — 26 / 05 / 2023

CHECKED BY

Trevor Lee Joe — 29 / 08 / 2023

REVIEWED BY

Karen Bell — 29 / 08 / 2023

APPROVED FOR ISSUE BY

Eva Matammu — 31 / 08 / 2023

Executive Summary

Watercare Services Limited (**Watercare**) is seeking a Notice of Requirement (**NoR**) to designate land on Glenbrook Beach Road to enable the construction, operation and maintenance of a new wastewater treatment plant (to be known as the Southwest Wastewater Treatment Plant (**SWWWTP**)). The site is near to the already consented treated wastewater discharge into the Waiuku Channel off the Clarks Beach golf course.

The specific site is located at 372 Glenbrook Beach Road, Waiuku. Sole road access is to Glenbrook Beach Road, a two-lane road connecting the village of Glenbrook Beach with Waiuku and the wider road network. The wastewater treatment plant (**WWTP**) is to be built in a series of stages to meet the anticipated growth of the residential areas in the southwest of Auckland, with Stage 1 (the commissioning) intended to cater for the current population as well as growth of up to 20,000 Population Equivalent (**PE**) demand. Stage 2 is an upgrade to the Stage 1 design, to cater for a population of up to 30,000PE. This is expected to be required over the next 30 years, but the timing depends on actual population growth rates. Stage 3 is tentatively forecasted for commencement beyond 2053 when the population is expected to reach approximately 60,000PE. Upgrades to the WWTP for Stage 3 will be completed in line with Auckland Council's growth projections.

From a transportation perspective, it is considered that potentially the main effect would occur during the construction phase of the public work when daily and peak hour traffic generation will be at its highest. Nonetheless, the additional vehicle movements per hour that are anticipated will have only a modest impact on the road network, with acceptable levels of service being maintained. During the operational phase, daily traffic volumes will be low, in the region of ten movements per day generated by operations and maintenance staff. Proposed mitigation measures during the construction phase include the provision of safe access and turning facilities and appropriate temporary traffic management signage.

Once the designation is confirmed, the design details will be developed, and details of the proposed works will be provided as part of the Outline Plan process. Under s176A of the RMA, Watercare must show the vehicular access and circulation arrangements, and provisions for parking for the works within the Outline Plan.

It is expected that Watercare will discuss changes to the site's existing vehicle crossing or the provision of any new crossings further with Auckland Transport (**AT**), and appropriate permits will be obtained from AT before the detailed design is confirmed, and the Outline Plan submitted.

While it is assumed upgrades to Glenbrook Beach Road will be required, discussion with AT will be undertaken with respect to the exact design details of the access facility and the timeline for implementation.

Although detailed plans for the development have not yet been produced, a review of the relevant transportation standards in the Auckland Unitary Plan (**AUP**) has concluded that the site is able to comply with these standards.

Contents

List of tables

List of figures

List of Appendices

Abbreviations

Abbreviations	Full Name
AADT	Average Annual Daily Traffic
AWT	Advanced Water Treatment
AEE	Assessment of Environmental Effects
AT	Auckland Transport
AUP	Auckland Unitary Plan
AUP: OP	Auckland Unitary Plan (Operative in Part 2016) (AUP: OP)
CAS	Crash Analysis System
CCO	Council Controlled Organisation
CBD	Central Business District
CTMP	Construction Traffic Management Plan
GIS	Geographic Information System
HV	Heavy Vehicle
LoS	Level of Service
NoR	Notice of Requirement
NZTA	New Zealand Transport Agency

PE	Population Equivalent
SHA	Special Housing Area
SISD	Safe Intersection Sight Distance
SWWWTP	Southwest Wastewater Treatment Plant
TMP	Traffic Management Plan
TTM	Temporary Traffic Management
vpd	Vehicles per day
vph	Vehicles per hour
WWTP	Wastewater Treatment Plant

1. Introduction

1.1 Watercare

Watercare Services Limited (**Watercare**) is a lifeline utility providing water and wastewater services to 1.7 million people in Auckland. Watercare supplies reliable, high-quality drinking water to homes and businesses in the Auckland region and collects, treats, and discharges their wastewater in environmentally responsible ways. Its services are vital for life, keep people safe and help communities to flourish.

As a council-controlled organisation (**CCO**), wholly owned by Auckland Council, Watercare manages water and wastewater assets worth over $14 billion and plan and build infrastructure to ensure that growth is supported today and into the future. Watercare's vision is to be "trusted by our communities to deliver exceptional performance every day". Watercare's mission is "reliable, safe and efficient water and wastewater services".

1.2 The purpose of this report

This report supports the Notice of Requirement (**NoR**) for designation of land to enable Watercare to construct, operate and maintain a new wastewater treatment plant (to be known as the Southwest Wastewater Treatment Plant (**SWWWTP**)) on a site at 372 Glenbrook Beach Road, close to the already consented treated wastewater discharge into the Waiuku Channel River off the Clarks Beach golf course.

This report is an assessment of the transportation effects of the proposed SWWWTP and supports the Assessment of Environmental Effects (**AEE**) that is being submitted with the NoR to Auckland Council. It assesses the effects of the designation in relation to the construction of the SWWWTP and its operation.

1.3 My involvement in the project

I am Alasdair McGeachie, a Principal Transportation Engineer at Stantec. My experience is in traffic and transportation engineering, including traffic impact assessments, road safety audits and level crossing safety.

I prepared the traffic generation analysis and assessment of potential access design parameters and attended project meetings. I arranged for a site visit (by Stantec colleagues) to occur on 2 March 2023 to measure widths of the existing vehicle access, sight distances from various locations on the site frontage, average speeds of vehicles passing in front of the site and undertake general observations.

2. The Project Description

Watercare has investigated how best to manage wastewater in the Southwest area in response to the anticipated growth identified in the Auckland Unitary Plan (Operative in Part 2016) (**AUP: OP**). Through this work, Watercare identified the need for a sub-regional Wastewater Treatment Plant (**WWTP**) to service the anticipated population growth in the Southwest growth area. The new WWTP is needed to enable Watercare to discharge treated wastewater into the Waiuku Channel in accordance with stringent treatment standards included within a discharge consent granted by the Environment Court in June 2018.

Following an assessment of potential alternative sites, Watercare has identified the site at 372 Glenbrook Beach Road (Lot 1 DP 367461) as its preferred location for the WWTP and is seeking to designate the full site. Designation of the site will enable construction and operation of the WWTP which will be delivered in stages. The designation provides for a WWTP at full build out that will provide the capacity to service a long-term population equivalent (**PE**) of 60,000 in the Southwest area. However, it is initially proposed to construct the first stage, a WWTP for 20,000 PE, followed by second stage upgrade to provide a WWTP for 30,000 PE (in line with the Southwest Discharge Consent's anticipated population growth).

The site's size and shape provide at least 200m of separation between the main parts of the plant itself and adjacent properties. The existing planting around the streams and wetlands will be retained. The areas not required for the full WWTP will be able to be used for farming or will be landscaped which will ensure that the current rural amenity provided by the site is retained.

Construction will commence as soon as possible after the designation is in place and the required regional resource consents are obtained.

Information regarding the design and operation of the WWTP is set out in the Indicative Design and Operational Report, prepared by Stantec dated April 2023 contained as Appendix A to the AEE supporting the NoR.

3. This Assessment

The following guides and statutory plans or requirements have been considered in the assessment of the SWWWTP.

- Guidance on appropriate standards for sight distance are provided in the Austroads publication Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Edition 3.1 2021). The sight distance is recommended to achieve Safe Intersection Sight Distance (SISD), which is based on the need for a driver on the main road to observe a vehicle waiting in the side road (driveway). A site visit was undertaken to measure sight distances from various locations on the site frontage.
- The proposal has been assessed against the Auckland Unitary Plan (AUP), specifically Chapter E27 - Transportation. It is noted that a further assessment against Chapter E27 is likely to be undertaken when the development plans are finalised, and the Outline Plan is prepared.
- The design and provision of access, parking, and servicing for the SWWWTP have been assessed against the AUP, and in the case of access, additional guidance has been obtained from the Austroads publications Guide to Road Design Part 4A: Unsignalised and Signalised Intersections and Guide to Traffic Management Part 6, Intersections, Interchanges and Crossings Management.
- The information regarding the frequency of vehicle movements during the construction and operation was provided by Watercare.
- The site plan used is the one referenced in the Indicative Design and Operational Report, prepared by Stantec dated April 2023. A copy of the site plan is provided in Appendix A.

Information on the site was collected during the site visit on 2 March 2023, supplemented by information available in the AUP maps, the Auckland Council Geographic Information System (GIS) system, public information on Private Plan Change 91 for a residential development at 80 McLarin Road, Glenbrook Beach and the Auckland Transport (**AT**) traffic count database.

4. Existing Environment

4.1 Site Location

The proposed site being considered for the SWWWTP is located at 372 Glenbrook Beach Road, Glenbrook. **Figure 4-1** is an aerial photograph showing the site in the wider context of the local area.

Figure 4-1: Site Locality Plan (372 Glenbrook Road is shown with the red star)

The site is currently used for agricultural activities and occupies an area of some 56 hectares. It is predominantly zoned as Rural- Mixed Rural in AUP. This zoning is intended to provide for rural production, generally on smaller scale sites and allow for non-residential activities (e.g cafés and tourist facilities). It is understood that not all of the site would be required for the WWTP assets and once the plant is constructed the balance of the site may revert to other horticultural activities or be landscaped.

F**igure 4-2** is a more detailed view which focuses on the site road frontage. The site only has road frontage to Glenbrook Beach Road. Vehicle access is currently provided by a single driveway near the southwestern boundary of the property.

Figure 4-2: Site Road Frontage Plan

The site's road frontage is interrupted by a single residential property at 424 Glenbrook Beach Road which is not part of the site. Not including 424 Glenbrook Beach Road, the site has a total road frontage of approximately 605m.

4.2 Traffic Environment

Glenbrook Beach Road is not classified as an arterial road in the AUP and defined as a secondary collector in the One Network Road classification system. Along the site's frontage it provides two traffic lanes, one in the northbound direction and one southbound separated by a painted centreline, with unsealed shoulders provided on both sides of the road.

The immediately surrounding activities are primarily horticultural including orchards and market gardens. Approximately 1km north of the site, is the small residential settlement of Glenbrook Beach, the Glenbrook Steel Mill is 3km south of the site, and Waiuku village 6km south. The Auckland Central Business District (**CBD**) is approximately 60km to the north by road.

Significant further residential development is proposed for the Glenbrook Beach area. Specifically, consent has previously been granted for the development of a large-scale Special Housing Area (**SHA**) of some 800 dwellings, 80 residential apartments and small local retail centre known as the Kawahai Point SHA. Additionally, a proposed Private Plan Change (**PC91**) comprising some 100 dwellings is currently in the consenting process. The potential additional traffic from this development is outlined in Section 4.6 of this report.

4.3 Glenbrook Beach Road Traffic Volumes and Speed

Along the site frontage Glenbrook Beach Road has a posted speed limit of 80km/h. Spot speed surveys undertaken by Stantec in on 2 March 2023 between 10am and 11am and discussed further in Section 6, indicated an operating (85th percentile) speed of approximately 60km/h in the vicinity of the site. A sample of 50 free-running vehicles travelling in each direction (ie. 50 northbound and 50 southbound) were assessed.

Recent traffic volume data from AT, via the Mobile Road website, indicates an average daily traffic volume of around 1,170 vehicles per day (vpd). Additional data from the AT website for Glenbrook Beach Road indicates higher traffic flows over the Christmas/ summer holiday period – in the region of 1,300-1,500 vpd.

4.4 Existing Site Traffic

The site is currently used for a variety of horticultural activities and hence has a variable traffic pattern throughout the year associated with periods of low traffic generation (crop growing season) and higher traffic generation (planting/ harvesting seasons). A variety of vehicle types are therefore expected to be currently servicing the site; light vehicles for staff and some machinery servicing activities, through to heavy vehicles utilised to transport harvested crops.

No specific data has been made available to Watercare or the project team of the existing typical trip generation pattern. Nor has any reduction been made to the traffic volumes on Glenbrook Beach Road for the removal of existing trip demands relating to the current site activities from the existing or future traffic environments as it is understood that some continued use of the site for horticulture may continue once the WWTP is operational.

4.5 Road Safety

A search of the New Zealand Transport Agency (**NZTA**)/ Waka Kotahi Crash Analysis System (**CAS**) database was undertaken for all reported crashes along the site frontage (including 424 Glenbrook Beach Road) plus 100m north and south, over the five-year period between 2018 and 2022, plus all available data from the partial 2023 reporting period.

Figure 4-3 illustrates the geographic extent of the crash search, and the reported crashes. The extent of the crash assessment area is shaded in blue with the site area indicated with a red border.

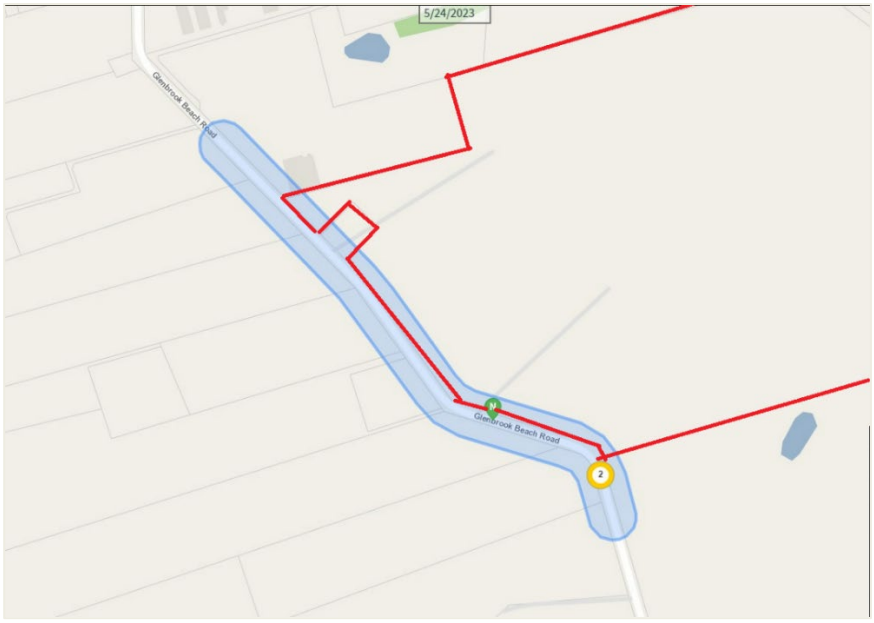


Figure 4-3: CAS Search area

Two minor injury crashes and one non-injury crash were reported within the search area. All crash events involved a loss of vehicle control while negotiating a bend or immediately after negotiating a bend. In one crash the vehicle which lost control then hit another vehicle whilst the other two incidents were single vehicle events.

Vehicle speed was reported to be a contributing factor in one crash and a lack of advisory sign for the bend was noted for another crash (this bend now has warning signage). In the non-injury crash the vehicle exited the road near the site access, after losing control further to the north-west. The crash record suggests that bends on Glenbrook Beach Road are a contributing factor with respect to vehicle speed and the safe operation of the road. As discussed in the later sections of this report, mitigation measures are proposed to manage vehicle access along the site frontage.

4.6 Public Transport

No public transport services operate along Glenbrook Beach Road at the present time. It is probable that as the Glenbrook Beach settlement develops, bus services may be provided to the area. Such bus services would use Glenbrook Beach Road but would be unlikely to stop in the vicinity of the site.

4.7 Future Traffic Environment

4.7.1 Background

It is understood that the SWWWTP will be developed in stages, with expansion of the scale and capacity of the facility occurring progressively to match and respond to population growth and hence demand in the catchment area. Although an exact development timescale has not been confirmed at this stage, this has the potential to be amended to reflect changes in population growth rates.

Identifying the future traffic environment over such distant horizons is complex given the potential changes in local development, traffic generation, traffic patterns and vehicle operation/ control which may occur within that timeframe.

At this juncture, only the 2032 traffic environment is assessed. This is because the construction works required to develop the SWWWTP to its Stage 2 configuration (potentially in the next 10 years) will include the most significant of the construction activities proposed and the creation of what is proposed to be the permanent site accesses. As these development components are those which have the most potential impact of the surrounding traffic environment and given the uncertainties in assessing the traffic environment in 2050 or beyond, it is considered that focusing on this shorter timeframe will result in a more robust assessment of effects.

4.7.2 2032 Traffic Environment

Consent has been granted for the Kawahai Point SHA and the development of 80 McLarin Road via Private Plan Change 91 is yet to complete its statutory process. Construction of the SHA is underway with well over 100 of the 800 dwellings

being completed. Full development of the Kawahai Point SHA is forecast to occur by 2030. The traffic assessment reporting undertaken for 80 McLarin Road also indicates that this development will be complete by 2030. Additionally, there is the background growth that may occur within the Glenbrook Beach area due to developments other than the two discussed above.

To align with the forecast completion years of both the Kawahai Point SHA and 80 McLarin Road developments, and to account for the potential SWWWTP development timeframe, 2030 has been adopted as the future year for the assessment of the traffic effects of the proposed SWWWTP. Based on the public information available[1] to Stantec, the projected 2030 traffic volume for Glenbrook Beach Road is around 9,370 vpd, with 8% heavy vehicles. However, it is considered that as the proposed developments are predominantly residential, the proportion of light vehicles to heavy vehicles on Glenbrook Beach Road will increase.

Peak hour volumes in 2032 are directly based on those provided in the Integrated Transport Assessment prepared by Traffic Planning Consultants Limited for Private Plan Change 91 –80 McLarin Road, (Issue B – March 2022). This report indicates forecast future peak traffic volumes of around 860vph and 1,011vph for the morning and afternoon peak hours respectively; and assumes full completion of both the Kawahai Point SHA and 80 McLarin Road development plus allowing for general background traffic growth. To extend to the assessment horizon to 2032, an allowance for traffic growth of 2% per annum has been adopted for the two years between 2030 and 2032. Consequently, the peak hour traffic volumes are 895vph and 1,050 vph for the morning and afternoon peak hour respectively.

These traffic volumes have been adopted for the traffic effects assessment covered in Section 5.2.

[1] Public documentation available regarding proposed Plan Change 91 on the Auckland Council website.

5. Effects Assessment

5.1 Outline

The principal transportation effect attributable to the proposed SWWWTP relates to the traffic generated by the site. The two scenarios to be considered relating to the traffic impact of the SWWWTP are:

i. the construction of the SWWWTP; and

ii. the long-term operation of the SWWWTP.

The construction phase has a forecast duration of two to three years, and once completed, the SWWWTP is expected to be in operation for over 50 years. The increased traffic (outlined in Section 5.2) associated with both the construction and the on-going operations of the SWWWTP will be assessed at the site access point on Glenbrook Beach Road and along the adjacent road corridors.

While the operation of the SWWWTP will occur over a far longer period than the construction stage, the construction period will, on a daily basis, generate far higher traffic volumes (of both light and heavy vehicles). Traffic volume details are discussed in the following section.

5.2 Construction Phase

The construction phase will generate a large number of heavy vehicle movements, forecasted to be approximately 40 heavy vehicle movements (20 inbound movements and 20 outbound movements) per day. The construction programme is anticipated to have approximately a two to three-year duration. There will also be an increase in light vehicle movements associated with the travel of construction staff to and from the site, estimated to be approximately 100 movements (total of inbound and outbound vehicle movements) per day.

Given the location of the closest population centres and arterial road network, it is assumed that the majority of construction traffic movements would access the site from the south via a right turn in and exit the site towards the south via a left turn out. Specifically, it is assumed that 95%of movements will follow the right in/ left out traffic pattern during construction.

The potential effect of the forecasted traffic generation during the construction period has been assessed using the intersection analysis modelling software SIDRA. For the purposes of providing a robust assessment, it has been assumed that the peak hour for construction traffic coincides with the peak hour of the road network. This is a conservative assessment as it is likely that the construction peak will occur prior to the network peak hour in the morning and after the network peak hour in the afternoon. Table 1 and Table 2 summarise the adopted traffic generation for the site during construction and Table 3 summarises the traffic volumes used in the SIDRA assessment. Heavy vehicle percentages are provided in brackets alongside the total volume undertaking the manoeuvre. The split between northbound and southbound through traffic movements on Glenbrook Beach Road is directly based on those provided in the Integrated Transport Assessment prepared by Traffic Planning Consultants Limited for Private Plan Change 91 –80 McLarin Road, (Issue B – March 2022). This report adopts a tidal traffic pattern (particularly for the morning peak period) with the majority of traffic heading towards the south (Pukekohe / Auckland) in the morning and returning from there in the evening.

Although there is an option to provide two driveways (e.g., an entry and a separate exit driveway) for the purposes of a conservative assessment it has been assumed in this assessment that only a single driveway, catering for both entry and exit movements is provided.

Table 1: Adopted morning peak hour traffic generation for SWWWTP during construction.

Assessment Period	Traffic Movements				
	Inbound		Outbound		Assumptions
		Right In	Left Out	Right Out	
Morning Peak Hour	1 (0%)	52 (4%)	7 (29%)	1 (0%)	Assumed ~50% of daily light vehicle movements occur in the morning peak hour. Assumed that 90% of light vehicle traffic is inbound in the morning peak. Assumed that majority of movements are right-in / left out. Assumed that 10% of heavy vehicle (HV) movements occur in the morning peak hour (2 inbound 2 outbound) and that all HV movements follow a right-in left out pattern.

Table 2: Adopted afternoon peak hour traffic generation for SWWWTP during construction

Afternoon Peak Hour	1 (0%)	7 (29%)	52 (4%)	1 (0%)	Assumed ~50% of daily light vehicle movements occur in the afternoon peak hour. Assumed that 90% of light vehicle traffic is outbound in the afternoon peak. Assumed that majority of movements are right-in / left out. Assumed that 10% of HV movements occur in the afternoon peak hour (2 inbound 2 outbound) and that all HV movements follow a right-in left out pattern.

Table 3: 2030 Modelled Traffic Volumes at site access with Glenbrook Beach Road

Assessment Period	Traffic Movements					
	Northbound		Southbound		Site	
	Through	Right In	Through	Left In	Left Out	Right Out
Morning Peak Hour	275 (8%)	52 (4%)	620 (8%)	1 (0%)	7 (29%)	1 (0%)
Afternoon Peak Hour	644 (8%)	7 (29%)	408 (8%)	1 (0%)	52 (4%)	1 (0%)

Again, to allow for a robust assessment of the potential traffic effects it has been conservatively assumed that no right turn bay has been provided and that vehicles turning right into the site would delay through vehicles on Glenbrook Beach Road. In practice if the recommended right turn bay (refer Section 6.3 below) is provided, then right turning vehicles would be out of the stream of through vehicles and hence delays for through vehicle would be lower than those reported in the SIDRA modelling.

The results of the SIDRA modelling are summarised in Table 4 below. The key performance indicators used for the assessment were average delay (seconds per vehicle) and Level of Service (LoS). LoS is a graduated scale from A to F based on measures such as delay, degree of saturation and congestion and speed efficiency, where A represents free-flow traffic conditions and F represents flow breakdown, high delay, and significant congestion.

Table 4: SIDRA Modelling Results

Intersection Leg	Movement	Morning Peak Hour		Afternoon Peak Hour	
		Level of Service	Delay (s)	Level of Service	Delay (s)
Glenbrook Beach Road (south)	Through	A	0.0	A	0.1
	Right	C	17.0	B	12.8
Glenbrook Beach Road (north)	Though	A	0.1	A	0.0
	Left	A	7.0	A	7.0
Site Access	Left	B	11.5	B	11.3
	Right	C	24.7	C	23.7
Intersection		C (worst)	1.2 (average)	C (worst)	1.2 (average)

The modelling results indicate there would be minimal delay to through vehicles with good levels of service maintained. Similarly delays to vehicles turning into or out of the site are predicted to be no more than 25 seconds. From an effects point of view this is considered to represent a minimal impact on the surrounding road network.

Additional data summaries including the SIDRA intersection layout are presented in Appendix B.

5.3 Long-Term Operation

Outside of the construction phase, traffic volumes to and from the site will generally be low – it is understood that 10 or less vehicles would travel to and from the site on a daily basis. Most of these vehicles would be light vehicles, utes and cars, with the occasional truck movement to deliver supplies and equipment to the site.

This vehicle volume is less than 1% of current daily traffic volume on Glenbrook Beach Road and the addition of the SWWWTP traffic to the background traffic flow on Glenbrook Beach Road would be indiscernible to most road users. The

type of traffic generated by the site is also consistent with that generated by the surrounding properties, as the various rural activities in the area will also be serviced by a mix of light and heavy vehicles.

If specific maintenance activities are forecast to generate a high volume of traffic movements or require access by over-dimension vehicles (e.g., if a large mobile crane is required to visit the site), then suitable temporary traffic management measures can be developed and implemented prior to these activities occurring in order to ensure little or no impact to the operation of the road network.

5.4 Access

The existing vehicle crossing, indicated in **Figure 5-1**, is located approximately 200m north of the southern site boundary. Currently sightlines at this vehicle crossing are inadequate, constrained by vegetation and a low bank in the roadside berm.

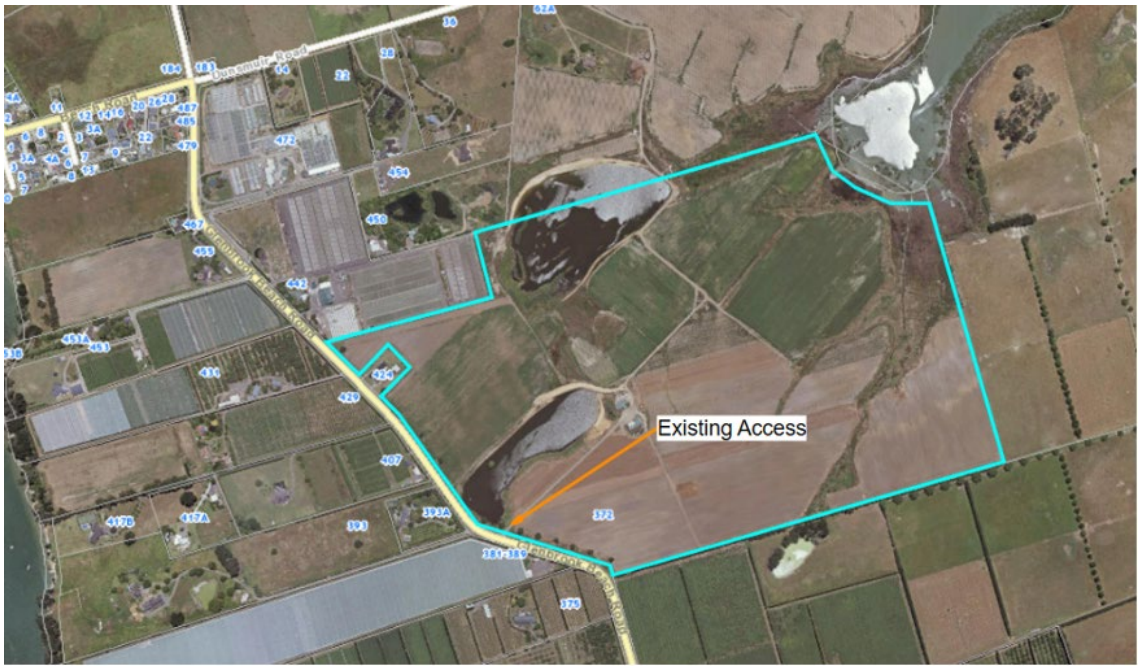


Figure 5-1: Current access location

During construction, the vehicle crossing will need to accommodate heavy vehicle movements potentially up to semi-trailer length. The current carriageway width of approximately 7m would likely require large heavy vehicles to enter the opposing lane to undertake the turn. Given the high speed of the frontage road, this is likely to have a high impact on opposing traffic.

Given the above, it is considered that the operation of the existing vehicle crossing without mitigation would have a negative effect on the adjacent road network. However, as detailed in Section 6, it is considered that appropriate upgrades and mitigations can be employed to develop a safe and practical vehicle crossing.

6. Mitigation

6.1 Access Location

Vehicle access to the SWWWTP site will be required for two purposes, namely:

a. The construction of the SWWWTP (construction staff and construction materials); and

b. The operation of the SWWWTP (operational and maintenance staff and vehicles).

To enable safe and efficient access, any access point(s) should be designed so as to provide an adequate line of sight between vehicles turning into or out of the site and through vehicles on Glenbrook Beach Road. The access should have sufficient dimensions to ensure that all vehicles expected to commonly access the site can do so in an efficient manner, without creating an overly wide access which could result in vehicles following potentially multiple paths for entry or exit. Lastly, sufficient capacity should be provided as to allow vehicles to enter and exit the site without creating undue delay to through vehicles, or queuing onto Glenbrook Beach Road.

At a high level, it is considered that there are three potential options for providing vehicle access to the site, namely:

i. Option 1. The use of the existing access with improvements to sightlines (vegetation removal and berm lowering), or

ii. Option 2. A new access further south of the existing access location, with the provision of adequate sightlines, or

iii. Option 3. Provision of two access points to the site (e.g., separate inwards and outwards driveways) using a combination of the existing access (with improvements as per option 1) and a new access (as per option 2).

As Option 3 is in effect a combination of Options 1 and 2, it is not separately discussed in all of the commentary below as the capacity and safety issues are considered as part of Option 1 or 2.

The road frontage north of the existing access is considered not suitable for an access due to internal constraints. In particular, sections of the area to the north of the existing access are part of a flood plain with risk of ponding.

The potential access locations for Options 1 and 2 are shown in Figure 6-1 below.

Figure 6-1: Site and potential access locations

The key factors in considering the suitability of these access location options are:

i. **Sight distance / Sight lines**. Ensuring a safe and sufficient line of sight is provided between vehicles entering/ exiting the site and through vehicles on Glenbrook Beach Road.

ii. **Operability and Capacity**. Providing a driveway of sufficient dimension and appropriate design to ensure that the expected number and type of vehicles can safely enter and exit the site with minimal impact on through traffic on Glenbrook Beach Road.

iii. **Adjacent Environment**. Providing access which has a minimal and manageable impact on adjacent driveways and properties.

iv. **Resilience** Given the critical infrastructure function of the SWWWTP providing an access which is usable in a variety of weather conditions by avoiding construction in a floodplain.

These factors are discussed in the following sections of this report.

Once the designation is confirmed, the design details are to be developed and details of the proposed works will be provided as part of the Outline Plan process.

Under s176A of the RMA, Watercare must show the vehicular access, circulation, and provision for parking for the works in the Outline Plan. It is expected that Watercare will discuss changes to the site's existing vehicle crossing or new crossings further with AT and appropriate permits will be obtained from AT before the detailed design is confirmed, and the Outline Plan submitted.

6.2 Sight Distance

A critical component of providing safe access is ensuring that road users are provided with suitable sightlines (sight distance) between a vehicle turning into or out of the site, and potentially opposing through vehicles on Glenbrook Beach Road.

Examples of the sight distance from the existing site access (Option 1) are provided in Figure 6-2 and Figure 6-3.

Figure 6-2: Driver perspective to the south from existing access (Option 1)

Figure 6-3: Driver perspective to the north from existing access (Option 1)

The effect of the vegetation and bank that limit the sight distance to the north of the access can be clearly seen in Figure 6-3.

Guidance on appropriate standards for sight distance is provided in the Austroads publication Guide to Road Design Part 4A: Unsignalised and Signalised Intersections. Given the intended use of the access by a mix of heavy and light vehicles (particularly during the construction phase), it is recommended that the sight distance requirements are to achieve Safe Intersection Sight Distance (**SISD**) – that is to say considering the access as an intersection, rather than a driveway.

SISD is based on the need for a driver on the main road to observe a vehicle waiting in the side road (driveway). The observation height requirements are based on both the main and side road vehicle being cars / light vehicles. While it is noted that during construction in particular a notable proportion of vehicles will be heavy vehicles which are generally taller than light vehicles, for the purposes of a conservative assessment the calculation for the WWTP site has been based on the light vehicle specification.

Sight distance requirements are determined by the operating speed of the frontage road, the gradient of the road and the type of road.

A spot speed survey was undertaken on 2 March 2023 between 10am and 11am. The speed of free-running vehicles was measured at the approximate limit of sight distance (from the current driveway position) using a laser speed gun. This identified an operating speed of just below 60 km/h for both westbound and eastbound vehicles. Although the proposed Option 2 access point is some 60m to the southeast of the existing Option1 driveway, due to the alignment of Glenbrook Beach Road and the vegetation / topographic constraints currently present at this location, the point at which an approaching vehicle becomes visible to a driver at either the Option 1 or 2 locations is effectively the same. Hence it is considered that the measurement of the operating speed from the Option 1 position covers that of the Option 2 position.

Based on an operating speed (85th percentile) of 60km/hr, a SISD of 123m is required in both directions. Table 5 below summarises the available sight distance and compliance of the Option 1 (existing) and Option 2 (alternative) driveway locations.

Table 5: Sight Distance Assessment

Location	Existing sight distance	Existing compliance with Austroads Requirements (123m)	Existing constraints on sight distance	Improvements	Compliant with Austroads Requirements (123m) with mitigation
Option 1	47m to the north and 180m to the south.	No. Sight distance to north deficient	Vegetation and high bank / berm	Removal / trimming of vegetation on both the road reserve and in the property. Berm lowered and power poles relocated.	Yes
Option 2	110m to the north and 123m to the south	No. Sight distance to north marginally deficient.	Vegetation and high bank / berm	Removal / trimming of the vegetation on the road reserve. Berm lowered and power poles relocated.	Yes

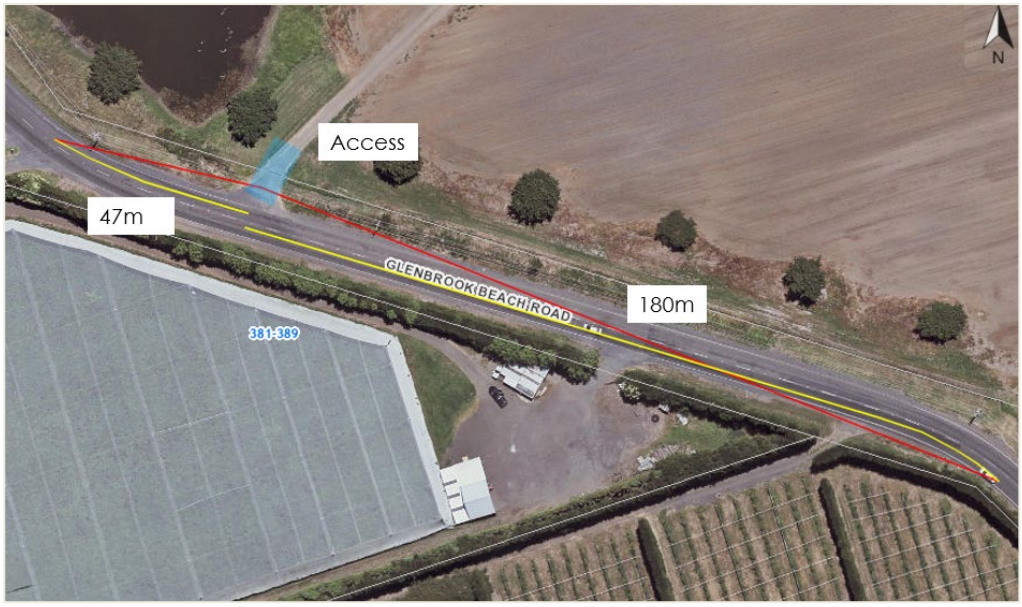


Figure 6-4: SISD for existing access without improvements

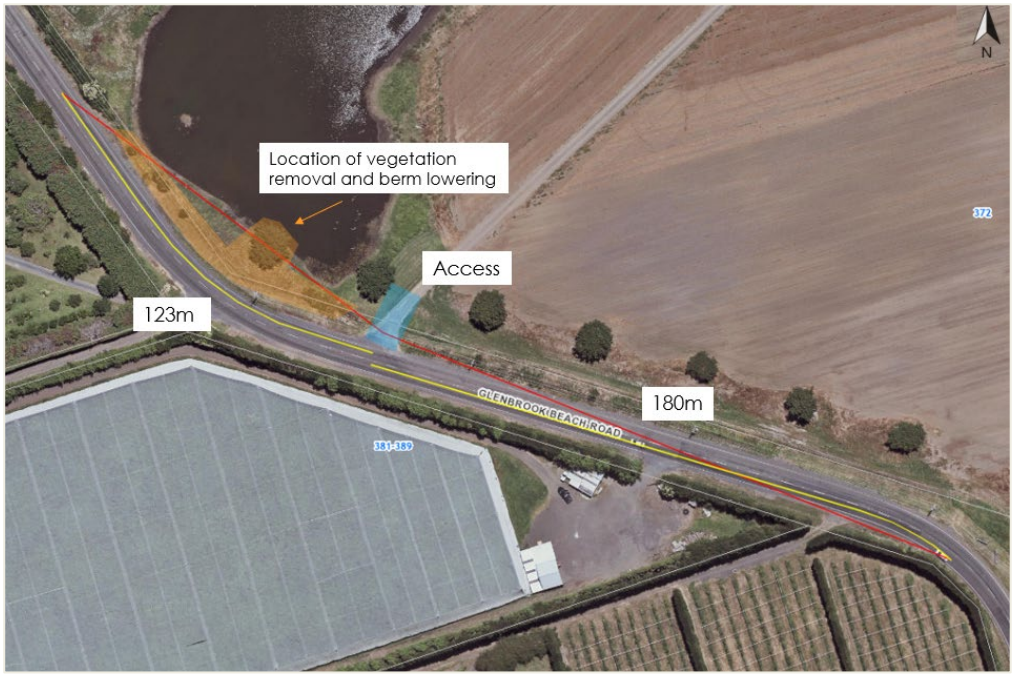


Figure 6-5: SISD for existing access with improvements

Land in the vicinity of the existing site access point would need some vegetation maintenance and minor earthworks to improve the sight distance to the north to comply with Austroads requirements. Sightlines are blocked by vegetation (both on site and on the side of the carriageway) and the vertical curve of the berm. Watercare would undertake regular maintenance of the vegetation within their site and appropriate vegetation would be selected for this corner of the site.

To the south the sight distance complies with the Austroads requirements.

Figure 6-6: SISD for Option 2 without improvements

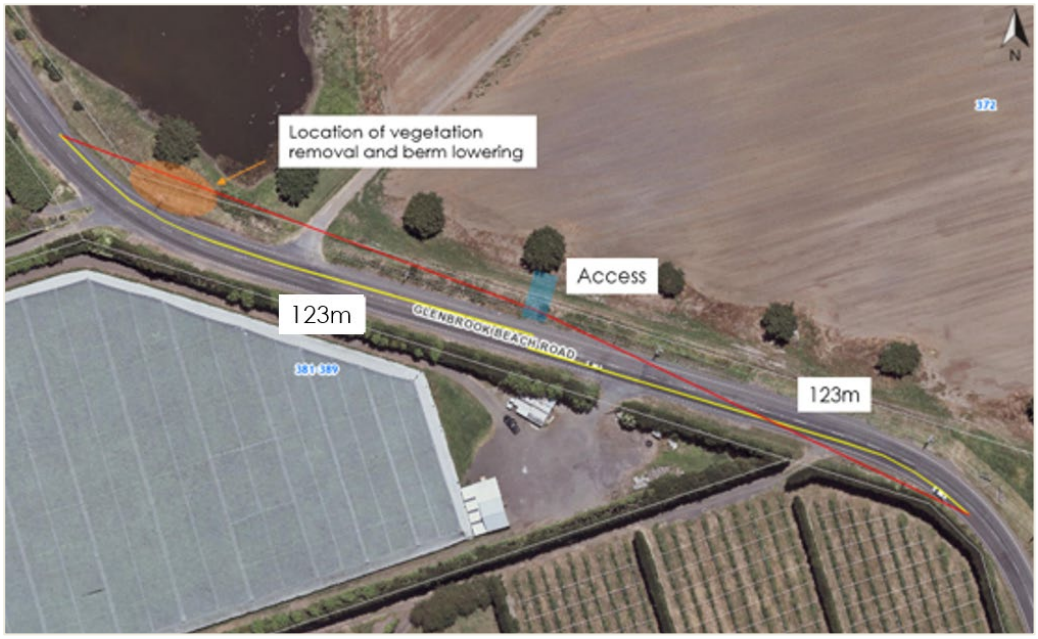


Figure 6-7: SISD for Option 2 with improvements

The Option 2 access point would be around 60m south of the existing location which would optimise the available sight distance in both directions, complying with Austroads requirements with proposed mitigation measures. However, any widening of the carriageway for the access would be more likely to intrude on property access to the south-west than for the Option 1 access. The widening of the road would potentially require a redesign to these vehicle crossings.

As outlined in Section 6.1, further assessment of any changes to the access that require road widening and impact on the sites on the opposite side of Glenbrook Beach Road will be undertaken following consultation with AT as part of the Outline Plan process.

The design plan “Indicative Configuration of Southwest WWTP” in the Indicative Design and Operational Report shows an access with two legs connecting to Glenbrook Beach Road. One leg connects at the Option 1 location, the other at the Option 2 location. This is in effect Option 3. Once the designation is confirmed the detailed design will be developed on. It is expected that Watercare will discuss changes to the site’s existing vehicle crossing or new crossings further with AT and appropriate permits will be obtained from AT before the detailed design is confirmed, and the Outline Plan submitted.

6.3 Access Capacity

The vehicle crossing(s) will need to accommodate heavy vehicle movements (particularly during the construction phase), potentially of up to semi-trailer length. It is desirable that the left turn movements for the heavy vehicles should not require them to enter an opposing lane to undertake the turn. In this case the WWTP vehicle crossing, southbound lane and shoulder should be sufficiently dimensioned and designed to allow for a heavy vehicle to turn left into or left out of the site without needing to intrude into the northbound lane.

Consequently, widening of the road shoulders would likely be required to support safe manoeuvring. It is noted that undertaking the requisite shoulder widening / vehicle crossing upgrade at the existing access location is constrained by the properties on the southwestern side of the road and the majority of widening would likely need to occur on the north-eastern side of the road.

During construction, there could be approximately 40 heavy vehicle movements over the course of a working day and potentially 100 or more light vehicle movements (construction staff). The heavy vehicle movements.

correspond to three to four truck movements per hour, while light vehicle movements will tend to be concentrated at the start and end of the workday, and hence have a higher peak hour volume.

The vehicle crossing(s) should at a minimum accommodate two-way light vehicle movements and it is recommended that a right turn bay is incorporated into the access design for any access to the site that involves a single driveway. Inclusion of a right turn bay would allow right turning traffic to wait outside of the through traffic lanes enhancing safety and reducing potential delay to through traffic. Detailed design will occur later in the project, but it is assumed that installation of a right turn facility would require widening on both sides of the carriageway to accommodate the necessary turn bay width and deflection of the through lanes. A right turn bay (temporary or permanent) would provide an enhancement to safety during construction works.

Outside of the construction phase, traffic volumes to and from the site will generally be low – it is understood that 10 or less vehicles would travel to and from the site on a daily basis.

Procedures for traffic movements to and from the site (e.g. restrictions on specific turn movements) would be set out if required in the appropriate management plan for the site, which is expected to be a Construction Traffic Management Plan (**CTMP**) for construction traffic operations, and an Operational Management Plan for when the site is in operational use.

On the southwestern side of the road there is a row of trees on the neighbouring property boundary which potentially constrains any future widening of the carriageway on that side unless trimming or removal of these trees occurs. Along the road frontage of the site near the access, there are up to three power poles that potentially would need to be moved if the widening of the carriageway was to occur on the eastern side of the road.

The trees and power poles can be seen in both Figure 6-7 and Figure 6-8.

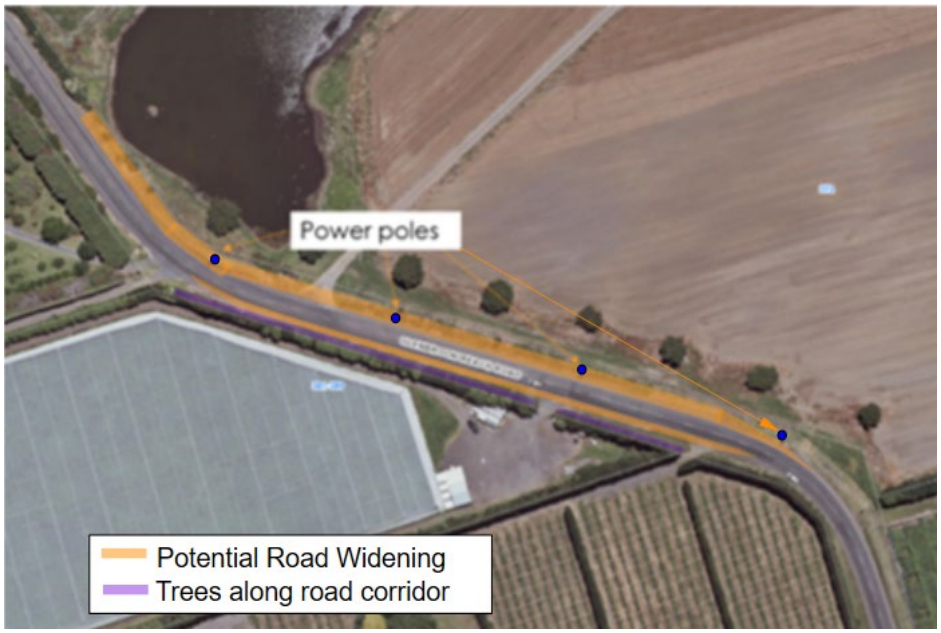


Figure 6-8: Likely area of road widening

There are no other adjacent vehicle crossings or neighbouring sites impacted by any improvements recommended. Further and more detailed design works will occur once the designation is confirmed. As part of preparing design for the Outline Plan a full assessment of the required road infrastructure changes to implement the access design will occur. Watercare will discuss changes to the site's existing vehicle crossing or new crossings further with AT.

6.4 Traffic Generation

As identified in Sections 5.2.1 and 5.2.2 above it is considered that there is only modest effect on the adjacent road network due to the proposed site traffic generation in either the Construction or Long-Term Operation scenarios, as such no specific mitigation measures are proposed beyond those discussed in Sections 6.2 and 6.3 above and 6.5 below.

6.5 Access Summary

There are three options for the access location. Option 1 being the existing access location, and Option 2 being an alternative location some 60m south of the existing location. Option 3 would be a combination, with two driveways provided (using the Option 1 and 2 locations).

In terms of design of the access, regardless of location, at a minimum, it is recommended that the access provided have:

- Sufficient sight distance as per SISD requirements
- Safe provision for right turns (preferably a right turn bay, particularly during construction)
- Sufficient width to allow two-way light vehicle movement and accommodate heavy vehicle movements during construction.

The exact scope and design of the site access, particularly with regard to construction, would be dependent on the traffic environment in place at the time of development.

It is noted that implementation of the site access (in either location) may require some or all of the following works or operational considerations.

- Works within the site
- Earthworks in the roadside berm
- Vegetation maintenance and planting controls
- Relocation or undergrounding of powerlines
- Carriageway widening
- Temporary or permanent changes to traffic controls or lane alignment

As such while it is considered that the need for upgrades to the roading environment both within the site and in the road, corridor are necessary, the final scope of such upgrades should be determined through discussion with AT as part of the detailed design works.

6.6 Construction Traffic Management Plan

Notwithstanding the implementation of the above mitigations, it is recommended that prior to construction a CTMP is prepared to consider appropriate temporary traffic management (**TTM**) measures to be implemented during construction. When construction operations are in progress access to the site would be controlled via a traffic management plan (**TMP**). This will mitigate the effect on the road users and provide safer operating conditions.

The CTMP should, as a minimum, address such matters as:

- Construction methodology and programme.
- Expected construction traffic volumes, types of heavy vehicles and site access points.
- Potential construction related traffic effects.

The CTMP should also:

- Identify mitigation measures and controls to appropriately address the potential construction effects.

- Outline any communication process for advising other road users and stakeholders of potential construction traffic effects.
- Outline construction worker parking arrangements and associated traffic management.

As part of the CTMP a site management plan will be required, outlining the loading zones and the way in which heavy vehicles will manoeuvre within the site. This will reduce the queuing of heavy vehicles, reducing the chance of the queue going on to the road.

An increase in heavy vehicle movements would require vehicles to use the opposing lane to make a turn into the driveway. To mitigate this effect, it is recommended to widen the road shoulders, provide a right turn facility, and improve sightlines to support safe manoeuvring during the main peak of construction.

7. Relevant Statutory Assessment

An appraisal of the development against relevant standards in Section E27 Transport of the AUP is provided in Table 6.

Table 6: Statutory Assessment

Standards	Description	Comments
E27.6.2. Number of parking and loading spaces		
E27.6.2(4)	The standard relies on Table E27.6.2.4 that sets out the parking rates which apply to the Business – Neighbourhood Centre Zone and all other zones and areas not specified in Table E27.6.2.1, Table E27.6.2.2 and Table E27.6.2.3. • **(T80) All other activities were located in rural zones: No minimum or maximum rate**	**Can Comply.** It is intended that a suitable on-site parking area is provided to accommodate the staff normally required to be on site.
E27.6.2 (8) Number of Loading spaces	All activities must provide loading spaces as specified in Table E27.6.2.7. • **(116) All other activities were located in rural zones - No minimum rate**	**Can Comply.** During construction suitable on-site loading area(s) will be provided. Once construction is completed on-site loading requirements will typically be modest. Again, suitable on-site provision is to be made for servicing.
E27.6.3. Design of parking and loading spaces		
E27.6.3.1. Size and location of parking spaces	(1)(a) Every parking space must comply with the dimensions given in Table E27.6.3.1.1 and Figure E27.6.3.1.1. • **For regular users, 90-degree parking spaces of 2.6m by 5.0m, 6.3m maneuvering space is required.** • **For casual users, 90-degree parking spaces of 2.6m by 5.0m, 7.0m maneuvering space is required.**	**Can Comply.** It is considered that this is sufficient space within the site to provide a parking area with appropriate dimensions to satisfy this rule.
	(1)(b) Every parking space must be located on the same site as the activity to which it relates.	**Can Comply.** It is intended to provide the parking area for the SWWWTP on-site.
	(1)(c) Every parking space must not be used for any other purpose.	**Can Comply.**
	(1)(d) Every parking space must be kept clear and available at all times the activity is in operation.	**Can Comply.**

Standards	Description	Comments
	(1)(e) Every parking space must be located outside any area designated for road widening.	**Can Comply.** As there is no designated road widening on the AUP planning maps.
E.27.6.3.2 Size and location of loading spaces	(1) Every loading space must comply with the minimum dimensions given in Table E27.6.3.2.1. • **All other activities: Length and width of loading space to be 8m x 3.5m.**	**Can Comply.** Given the specific purpose and operation of the site, the loading space will be designed to be fit for purpose**.**
E27.6.3.3 Access and manoeuvring	(1) Every parking space must have driveways and aisles for entry and exit of vehicles to and from the road, and for vehicle manoeuvring within the site. Access and manoeuvring areas must accommodate the 85 percentile car tracking curves in Figure E27.6.3.3.	**Can Comply.** An appropriately designed access could be achieved to comply with this condition.
	(2) Where access and manoeuvring areas must accommodate heavy vehicles, a tracking curve for an appropriately sized truck for the type of activities to be carried out on the site must be assessed. Heavy vehicle tracking curves are set out in the following NZTA guidelines: RTS 18: NZ on-road tracking curves (2007).	**Can Comply.** An appropriately designed access could be achieved to comply with this condition.
E27.6.3.4 Reverse manoeuvring	(1)(a) Sufficient space must be provided on the site so vehicles do not need to reverse off the site or onto or off the road from any site where four or more required parking spaces are served by a single access.	**Can Comply.** There is sufficient space on-site for cars to manoeuvre and exit the site in a forward direction.
E27.6.3.5 Vertical clearance.	(1)(a) To ensure vehicles can pass safely under overhead structures to access any parking and loading spaces, the minimum clearance between the formed surface and the structure must be 2.3m where access and/or parking for cars is provided for all other activities, and 2.5m where access and/or accessible parking for people with disabilities is provided.	**Can Comply.** Stantec understands the parking area will not be under any overhead structure, thus providing compliant clear height.
E27.6.3.6 Formation and gradient	(1) Except for Standard E27.6.3.6(2) below, the whole area of parking and loading spaces, and manoeuvring areas and aisles must be formed, drained, provided with an all-weather surface to prevent dust and	It is noted that under E27.6.3.6 (2) Parking and loading spaces and manoeuvring areas and aisles do not need to be provided with an all-weather surface in the Rural - Mixed Rural zone which applies to the site.

Standards	Description	Comments
	nuisance, and be marked out or delineated. This must be done before the activity to which those parking and loading spaces relate commences, and maintained for as long as that activity is continued	
	(3) The gradient for the surface of any parking space must not exceed 1 in 25 in any direction for accessible spaces for people with disabilities, and 1 in 20 (five per cent) in any direction for other spaces.	**Can Comply.** It is considered that site works can occur to achieve a suitable compliant parking area.
	(4) The gradient for the manoeuvring area for parking spaces must not exceed 1 in 8 (12.5%).	**Can Comply.** It is considered that site works can occur to achieve a suitable compliant parking area.
E27.6.3.7. Lighting	(1) Lighting is required where there are 10 or more parking spaces which are likely to be used during the hours of darkness. The parking and manoeuvring areas and associated pedestrian routes must be adequately lit during use in a manner that complies with the rules in Section E24 Lighting.	**Can Comply.**
E27.6.4.1 Vehicle Access Restrictions	(1)(a), Vehicle Access Restrictions apply, and vehicle crossings must not be constructed to provide access across that part of a site boundary which is subject to: (a) a Vehicle access Restriction – General Control as shown on the planning maps in the Business – City Centre Zone; or (b) a Key Retail Frontage Control as shown on the planning maps; Infringing this standard is a non-complying activity unless the application involves: (i) the use of an existing vehicle crossing to service the establishment of a new activity, a change of activity type, the expansion of intensification of an existing activity or where a building(s) is constructed, or additions to building that are not permitted activities in: Table H8.4.1, Table H9.4.1 or Table H10.4.1 (ii) the construction of a new vehicle crossing, and the establishment of the vehicle crossing is to relocate and/or amalgamate an existing vehicle crossing or crossings serving the site or will otherwise not increase the number or width of vehicle crossings serving a site;	**Complies.** The site is outside any area where Vehicle Access Restrictions apply as there is no intersection located within 10m of the property boundary.

Standards	Description	Comments
	or there is no other means of serving a site.	
	(2) Standard E27.6.4.1.(3) below applies in any of the following circumstances: (a) a new vehicle crossing is proposed. (b) a new activity is established on a site: (c) there is a change of type of activity; or (d) a building(s) is constructed, or additions buildings that are not permitted activities in Table H8.4.1, Table H9.4.1 Table H10.4.1 Table H11.4.1 Table H12.4.1 Table. H13.4.1 Table H14.4.1 or Table H15.4.1	**Applies.** A new activity is to be established on the site.
	(3) Vehicle Access Restrictions apply, and vehicle crossings must not be constructed or used to provide vehicle access across that part of a site boundary which: (a) is located within 10m of any intersection as measured from the property boundary, illustrated in Figure E27.6.4.1.1. (b) is subject to the following types of Vehicle Access Restriction as identified on the planning maps in the zones listed in Table E27.6.4.1.1. (c) has frontage to an arterial road as identified on the planning maps; or (d) is located closer than 30m from a railway level crossing limit line.	**Complies.** The site does not trigger any of the four criteria.
E27.6.4.2 Width and number of vehicle crossings	(1) The maximum number of vehicle crossings permitted for sites is 1 per 25m of frontage or part thereof and the minimum separation distance between crossings serving adjacent sites is 2m provided that two crossings on adjacent sites can be combined where they do not exceed a total width of 6m at the property boundary. The minimum separation between crossings serving the same site is 6m.	**Can Comply.** The site has a frontage of over 600m. The minimum separation or greater will be provided between any crossing(s) on the site.
	(2) The width of vehicle crossings must meet the minimum width and not exceed the maximum width at the property boundary as specified in Table E27.6.4.3.2:	

Standards	Description	Comments
	Crossings are between 6.0m and 7.0m-wide when serving 10 or more parking spaces. *Provided that a maximum width of 9.0m is permitted where the crossing needs to accommodate the tracking path of large heavy vehicles*	**Can Comply.** It is probable that an access of up to the maximum width of 9.0m may be required to support heavy vehicle access.
	(3) With the exception of vehicle crossings on unsealed roads, all vehicle crossings must be designed and constructed to maintain the level, colour, and materials of the footpath to clearly identify to vehicles that pedestrians have priority.	**Does not apply.** There is no footpath along the site frontage.
E27.6.4.3Width of vehicle access and queuing requirements	(1)(a) Every on-site parking and loading space must have vehicle access from a road, with the vehicle access complying with the following standards for width: Passing bays are provided in accordance with Table E27.6.4.3.1 • **Increase formed width of access to 5.5m over a 15m length when length of access exceeds 100m and width of access is less than 5.5m.** • **Maximum intervals between passing bays is 100m.**	**Can Comply.** The internal access will be designed to adequately accommodate the anticipated traffic usage.
	(1)(b) Every on-site parking and loading space must have vehicle access from a road, with the vehicle access meeting the minimum formed access width specified in Table E27.6.4.3.2: • **T156 Rural zones - 3.0m is specified as the minimum width at the site boundary and 6.0m is specified as the maximum width of crossing at site boundary No minimum formed access width is specified**	**Can Comply**
E27.6.4.4Gradient of vehicle access	(1)T158 The gradient of vehicle access used by heavy vehicles must not be steeper than 1 in 8 (12.5%). The gradient of an access serving all other activities must not be steeper than 1 in 6 (16.7%).	**Can Comply.** The site's topography can be modified as and if required to achieve the appropriate gradients.
	(2) To avoid the underside of the car striking the ground, access with a change in gradient exceeding 1 in 8	**Can Comply.** The site access will be designed to meet this standard.

Standards	Description	Comments
	(greater than 12.5% change) at the summit or a 1 in 6.7 (15% change) at a sag must include transition sections to achieve adequate ground clearance. Typically, a transition section requires a minimum length of 2m.	

Summary statement on compliance

From the currently available information, the assessment above in relation to the relevant standards in E27 indicates that it should be practicable for the site to comply with the transportation requirements of the AUP.

It is noted that at this stage, specific details of some site features (e.g., the parking area) are not yet available and the assessment has been based on the development intentions and potential ability of the site due to achieve compliance, based on matters such as site area.

Once the designation has been approved an Outline Plan will be developed and submitted to Auckland Council. Under s176A of the RMA, Watercare must show the vehicular access, circulation, and provision for parking for the works in the Outline Plan. A further compliance review should occur during this phase to revalidate this assessment. Compliance with the relevant standards should be achieved and the extent of any non-compliance (if any) appropriately assessed to ensure that a best practical solution is achieved.

The indicative design has been used to enable the transport effects of the Notice of Requirement to be assessed as the Council must consider the effects of the designation.

Once the designation is confirmed, the design details are to be developed and details of the proposed works will be provided as part of the Outline Plan process. Under s176A of the RMA, Watercare must show the vehicular access, circulation, and provision for parking for the works in the Outline Plan. It is expected that Watercare will discuss changes to the site's existing vehicle crossing or new crossings further with AT and appropriate permits will be obtained from AT before the detailed design is confirmed, and the Outline Plan submitted.

8. Conclusions

Watercare intends to designate land at 372 Glenbrook Beach Road for the construction, operation and maintenance of a WWTP to service the existing population and forecasted population growth in the south-west of Auckland.

From a transportation perspective there are two scenarios in which the traffic effects of the proposed WWTP have been assessed – Construction and Long-Term Operation. During the typical operation of the WWTP, traffic generation will be low – approximately 10 movements per day, whereas during the peak of construction (assumed to be during the First and Seconds Stage by 2032) there may be in the region of 140 traffic movements per day.

Potential mitigations during the construction phase include the provision of safe access and turning facilities and appropriate temporary traffic management signage.

Given the current roadside vegetation, berm formation and carriageway width of Glenbrook Beach Road, it is expected that upgrades either within the site and / or in the road corridor, will be required. However, the final design of such facilities will need to occur during the detailed design phase and discussion with AT will be required to determine the exact extent of any such upgrade.

Although detailed plans for the development have not yet been produced, a review of the relevant transportation standards in the AUP has concluded that the site can comply with these requirements.

Therefore, it is concluded that subject to resolving the upgrade to the road there are expected to be only low-level transport effects arising from construction and operation of the WWTP in accordance with the designation.

Appendices

Appendix A GBR Site Plan

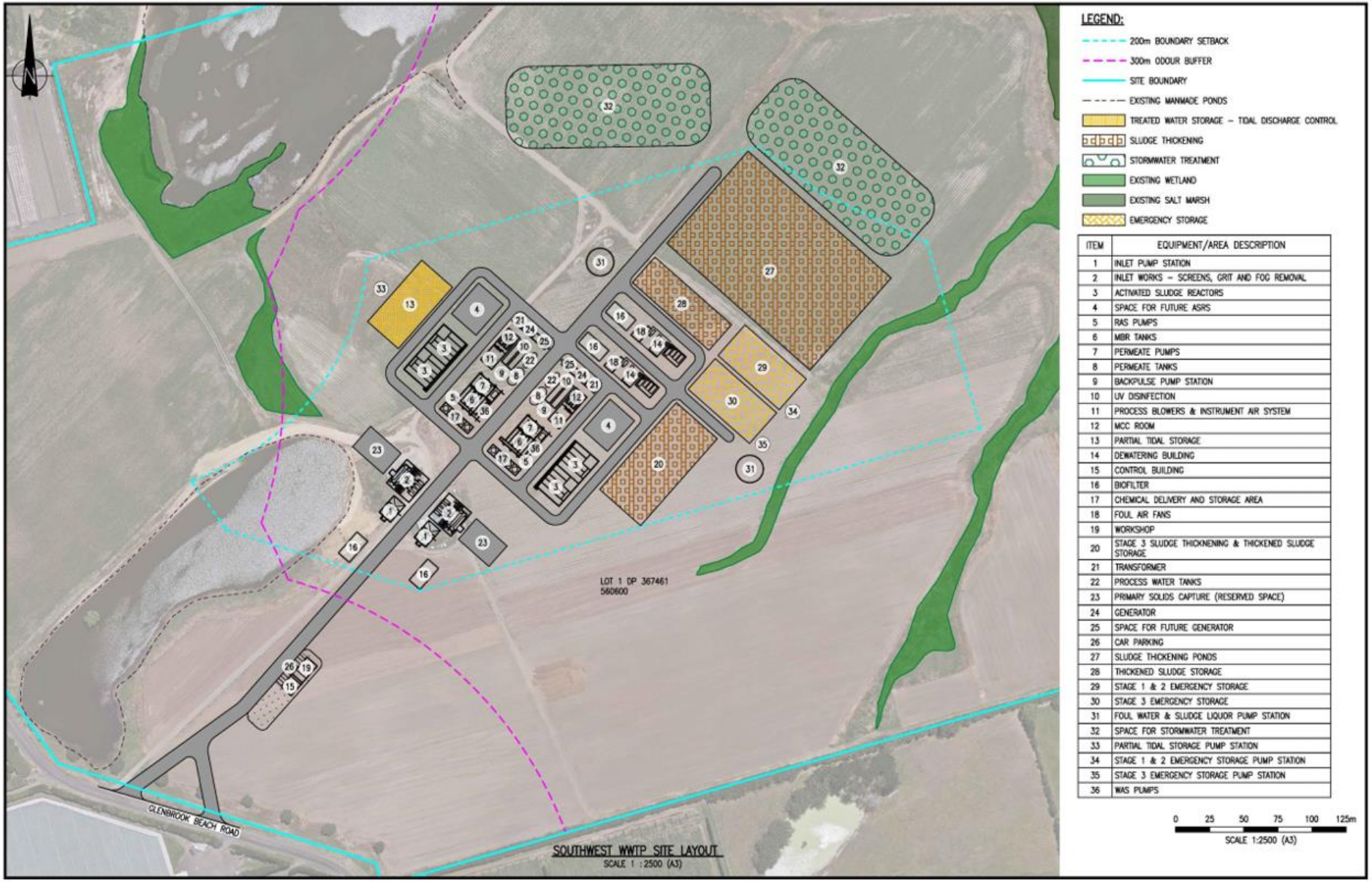


Figure 1: Indicative Configuration of Southwest WWTP

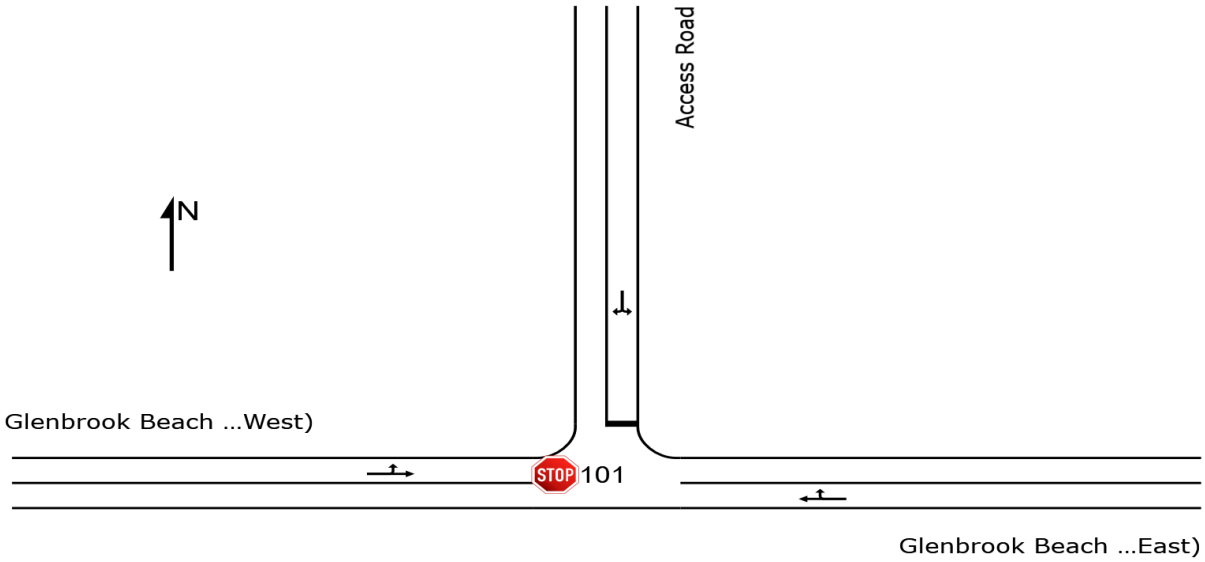
Appendix B GBR SIDRA

SITE LAYOUT

Site: 101 [GBR Access - AM Peak (Site Folder: General)]

New Site
Site Category: (None)
Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [GBR Access - AM Peak (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Glenbrook Beach Road (East)															
5	T1	All MCs	289	8.0	289	8.0	0.225	0.0	LOS A	0.7	5.5	0.26	0.33	0.26	75.5
6	R2	All MCs	55	4.0	55	4.0	0.225	17.0	LOS C	0.7	5.5	0.26	0.33	0.26	56.8
Approach			344	7.4	344	7.4	0.225	2.7	NA	0.7	5.5	0.26	0.33	0.26	71.7
North: Access Road															
7	L2	All MCs	1	0.0	1	0.0	0.041	11.5	LOS B	0.1	0.9	0.78	1.01	0.78	43.4
9	R2	All MCs	7	29.0	7	29.0	0.041	24.7	LOS C	0.1	0.9	0.78	1.01	0.78	39.1
Approach			8	25.4	8	25.4	0.041	23.0	LOS C	0.1	0.9	0.78	1.01	0.78	39.6
West: Glenbrook Beach Road (West)															
10	L2	All MCs	1	0.0	1	0.0	0.353	7.0	LOS A	0.0	0.0	0.00	0.00	0.00	73.3
11	T1	All MCs	653	8.0	653	8.0	0.353	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach			654	8.0	654	8.0	0.353	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.7
All Vehicles			1006	7.9	1006	7.9	0.353	1.2	NA	0.7	5.5	0.10	0.12	0.10	76.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [GBR Access - PM Peak (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Glenbrook Beach Road (East)															
5	T1	All MCs	678	8.0	678	8.0	0.375	0.0	LOS A	0.1	0.8	0.02	0.02	0.02	79.7
6	R2	All MCs	7	29.0	7	29.0	0.375	12.8	LOS B	0.1	0.8	0.02	0.02	0.02	58.5
Approach			685	8.2	685	8.2	0.375	0.1	NA	0.1	0.8	0.02	0.02	0.02	79.4
North: Access Road															
7	L2	All MCs	1	0.0	1	0.0	0.247	11.3	LOS B	0.8	5.5	0.83	1.03	0.93	42.8
9	R2	All MCs	55	4.0	55	4.0	0.247	23.7	LOS C	0.8	5.5	0.83	1.03	0.93	42.5
Approach			56	3.9	56	3.9	0.247	23.5	LOS C	0.8	5.5	0.83	1.03	0.93	42.5
West: Glenbrook Beach Road (West)															
10	L2	All MCs	1	0.0	1	0.0	0.232	7.0	LOS A	0.0	0.0	0.00	0.00	0.00	73.4
11	T1	All MCs	429	8.0	429	8.0	0.232	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach			431	8.0	431	8.0	0.232	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.8
All Vehicles			1172	7.9	1172	7.9	0.375	1.2	NA	0.8	5.5	0.05	0.06	0.06	76.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Stantec New Zealand
Level 3, 111 Carlton Gore Road, Newmarket 1023

PO Box 13-052, Armagh, Christchurch 8141
Tel +64 9 580 4500

Connect with us

stantec.com/nz